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**United States Patent** [19][11] **Patent Number:** **5,510,103****Yokoyama et al.**[45] **Date of Patent:** **Apr. 23, 1996**[54] **PHYSICAL TRAPPING TYPE POLYMERIC  
MICELLE DRUG PREPARATION**[75] **Inventors:** **Masayuki Yokoyama**, Matsudo;  
**Yasuhisa Sakurai**, Tokyo; **Teruo  
Okano**, Ichikawa; **Kazunori Kataoka**,  
Kashiwa, all of Japan[73] **Assignee:** **Research Development Corporation  
of Japan**, Japan[21] **Appl. No.:** **465,499**[22] **Filed:** **Jun. 5, 1995****Related U.S. Application Data**[62] Division of Ser. No. 105,535, Aug. 11, 1993, Pat. No.  
5,449,513.[30] **Foreign Application Priority Data**Aug. 14, 1992 [JP] Japan ..... 4-217044  
Aug. 3, 1993 [JP] Japan ..... 5-192586[51] **Int. Cl.<sup>6</sup>** ..... **A61K 31/74**; A61K 9/127[52] **U.S. Cl.** ..... **424/78.08**; 424/78.17;  
424/450; 424/451; 424/489; 424/501; 428/401.21;  
428/402.24[58] **Field of Search** ..... 514/963; 424/450,  
424/451, 489, 501, 78.17, 78.08; 428/402.21,  
402.24[56] **References Cited****U.S. PATENT DOCUMENTS**5,124,151 6/1992 Viegas et al. .... 424/422  
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*Primary Examiner*—Nathan M. Nutter*Attorney, Agent, or Firm*—Pennie & Edmonds[57] **ABSTRACT**

The present invention relates to drug carriers composed of a block copolymer having hydrophilic and hydrophobic segments, a polymeric micelle type drug comprising hydrophobic drugs trapped by physical treatments in said drug carrier and methods for trapping hydrophobic drugs in the drug carrier. The drug carrier composed of the block copolymer according to the invention forms a stable polymeric micelle structure with which hydrophobic drugs can be incorporated very efficiently via physical trapping. It was found that the incorporated drug is stably maintained in micelles even in the presence of serum. In addition, a drug difficult to administer into the living body owing to sparing water-solubility for its high hydrophobicity can be administered in the form of polymeric micelle drug.

**5 Claims, 6 Drawing Sheets**